*Superfund Proposed Plan* U.S. Environmental Protection Agency, Region II

# Cinnaminson Groundwater Contamination Superfund Site
## Townships of Cinnaminson and Delran, New Jersey

April 2014

## EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the preferred alternative for cleanup of the landfills that are situated within the Cinnaminson Groundwater Contamination Superfund Site in the Townships of Cinnaminson and Delran, New Jersey. This phase of work or operable unit (OU) is considered OU2. The landfills were closed and continue to be maintained under New Jersey state solid waste regulations; however, when EPA selected a remedy for OU1 of the Site, the agency had not determined whether the landfill caps were adequately protective of groundwater. The United States Environmental Protection Agency (EPA) has determined that the preferred alternative for OU2 is that no action is necessary. Previous response actions at the Site have eliminated existing or potential risks to human health and the environment such that no action is necessary for this phase of work.

This Proposed Plan was developed by the EPA, the lead agency for the Site, in consultation with the New Jersey Department of Environmental Protection (NJDEP), the support agency. EPA, in consultation with NJDEP, will select a final remedy for the landfills at the Site after reviewing and considering all information submitted during the 30-day public comment period. EPA, in consultation with NJDEP, may modify the preferred alternative or select another response action based on new information or public comments. Therefore, the public is encouraged to review and comment on the information presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).

### MARK YOUR CALENDARS

**Public Comment Period**
**April 30 – May 29, 2014**

EPA will accept written comments on the Proposed Plan during the public comment period.

**Public Meeting**
**May 12, 2014 at 7:00 P.M.**

EPA will hold a public meeting to explain the Proposed Plan and the alternatives presented in the Feasibility Study. Oral and written comments will be accepted at the meeting. The meeting will be held at the Cinnaminson Community Center at 1621 Riverton Road, Cinnaminson.

**For more information, see the Administrative Record at the following locations:**

**EPA Records Center, Region 2**
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday – 9 A.M. to 5 P.M.

**Cinnaminson Public Library**
1619 Riverton Road
Cinnaminson, New Jersey 08077
(856) 829-9340



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This Proposed Plan summarizes information that can be found in greater detail in the *Final Focused Feasibility Study (OU2 FFS) Report on Source Control Alternatives for the SLI Landfills – Operable Unit No. 2.*

## SITE DESCRIPTION

The Site covers approximately 400 acres and is considered an area-wide groundwater contamination site. The Site is located in the Townships of Cinnaminson and Delran, Burlington County, New Jersey and includes properties bounded by Union Landing Road, Route 130, River Road and Taylors Lane. The Site area includes two closed landfills, along with residential and light to heavy industrial properties (Figure 1).

The Delaware River is located northwest of the Site and U.S. Route 130 passes southeast of the Site. Two small streams, Pompeston Creek and Swede Run provide run-off from the Site into the Delaware River.

## SITE HISTORY/ENFORCEMENT ACTIVITIES

The landfill property within the Site area was originally owned by Lockhart Construction Company and was operated as a sand and gravel mining pit. The depth of the mining excavations ranged from 20 feet to between 60 to 70 feet below the current surface elevation.

During the late 1950s, municipal solid waste was deposited into the completed mining pits while sand and gravel mining continued on other parts of the property. When mining operations ceased in the late 1960s, larger amounts of refuse and solid wastes were deposited into the abandoned pits.

Sanitary Landfill Inc., (SLI), a subsidiary of Waste Management, Inc., purchased the property, which included areas known as the northwest landfill and southeast landfill (collectively, the SLI LFs) in 1970 and was permitted by the NJDEP to continue landfilling operations. Municipal and institutional wastes, bulky wastes, dry and liquid sewage sludge, construction and demolition wastes, vegetable and food processing wastes, and industrial wastes, including hazardous substances were deposited in the two areas. An average of 240,000 tons/year of waste was deposited at the Site during the 1970s. The landfill operations completely filled pits formed by the sand and gravel excavations and rose from 10 to 40 feet above the original surface elevation.

On September 27, 1980, NJDEP issued an Administrative Order to SLI to close the SLI LFs. In 1981, Waste Management, Inc., on behalf of SLI, submitted a closure plan for the SLI LFs, which was approved by NJDEP that year.

As part of the approved closure plan, the two landfill areas were to be capped with 18 inches of clay. The approved closure plan also required the installation of a landfill gas collection and venting system, and the initiation of a groundwater monitoring program. The capping requirements were further detailed in an NJDEP Administrative Consent Order (ACO) with SLI issued in October 1984 and were based on *"Plans for Closure of Sanitary Landfill, Inc.,"* dated May 1984.

Concurrent with the landfill closure activities, groundwater contamination, primarily with volatile organic compounds (VOCs), was detected near the landfills. In October 1984, EPA proposed the Cinnaminson Groundwater Contamination Site to the National Priorities List (NPL) and it became final on the NPL in June 1986.

Verification of groundwater contamination was based in part on the results of groundwater monitoring performed by SLI, as required by the NJDEP-approved closure plan.

The overall Site cleanup is being addressed by EPA in four phases or operable units (OU). Operable Unit 1(OU1) addresses groundwater contamination and was originally expected to be a comprehensive Site remedy. While other potential sources were identified, the OU1 RI concluded that the SLI LFs were a primary source of groundwater contamination. As discussed in more detail below, subsequent investigations have led to other significant VOC sources and additional operable units for the Site *(*see *Scope and Role of the Action*). Operable Unit 2 (OU2) addresses the effectiveness of the existing SLI LF caps. Operable Unit 3 (OU3) addresses the contamination associated with the former BOC Gases facility, and Operable Unit 4 (OU4) addresses any other groundwater contamination outside of areas already under remediation or investigation. The operable units are summarized below.

OU1: Contaminated Groundwater

EPA conducted the OU1 Remedial Investigation (OU1 RI) from 1985 to 1989 to determine the sources, and nature and extent of groundwater contamination. The OU1 RI activities included field surveys, hydrogeologic investigations, groundwater sampling, surface water/sediment sampling and potable well sampling. The OU1 RI identified the presence of VOCs in two aquifers, using data from 87 monitoring wells. VOCs detected in the groundwater included vinyl chloride, 1, 2-dichloroethane, trichloroethene (TCE), tetrachloroethene (PCE), trichloroethane, and benzene.

| **RESPONSE ACTIONS** | **DESCRIPTION AND STATUS** |
|---|---|
| OU1 ROD<br>September 1990<br><br>*Contaminated groundwater* | Addresses groundwater contamination for which a major source is the SLI LFs. Groundwater remedy includes extraction and treatment with reinjection of treated groundwater. |
| Removal Action<br>September 2010<br><br>*Vapor Intrusion (VI) Investigation & Mitigation* | Vapor intrusion investigation at 60 properties. Installation of VI systems at 2 residential properties. VI investigation on-going. |
| OU2 ROD<br>(2014)<br>The subject of this Proposed Plan.<br><br>*Landfill cap and gas mitigation system* | Addresses adequacy of previous SLI LFs closure including capping and SLI landfill gas mitigation system enhancements. |
| OU3 ROD<br><br>*Contaminated soil and groundwater associated with former BOC Gases facility* | Will address soil and groundwater contamination at the former BOC Gases facility. RI/FS in progress. |
| OU4 ROD<br><br>*Area-wide groundwater contamination that has migrated beyond the identified source areas, including the SLI LFs and the former BOC Gases facility.* | Will address groundwater contamination that has migrated beyond identified sources. RI/FS in progress. |

EPA conducted a risk assessment to evaluate the potential risks to human health and the environment associated with the Site. The risk assessment concluded that contaminated groundwater is the exposure medium of

greatest concern, resulting in the following OU1 Remedial Action Objectives (RAOs):

- To satisfy applicable or relevant and appropriate local, State and Federal requirements (ARARs);
- to reduce continued degradation of the groundwater; and,
- to prevent contaminants from migrating toward existing municipal drinking water wells.

An OU1 Feasibility Study (OU1 FS) was prepared by EPA and completed in 1989. The OU1 Record of Decision (OU1 ROD) dated September 28, 1990, selected the following remedy to address contaminated groundwater:

- Extraction and treatment of contaminated groundwater from both the shallow and deep aquifers;
- Reinjection of treated water into the deep aquifer; and
- Installation and monitoring of additional wells to ensure the effectiveness of the remedy.

In June 1991, EPA issued a Unilateral Administrative Order (1991 UAO) to Sanitary Landfill, Inc., a predecessor to SC Holdings, Inc., (SCH), which is a subsidiary of Waste Management, Inc. that required implementation of the groundwater remedy described in the OU1 ROD. Pre-design investigatory work provided new information on groundwater flow rates and the extent of contamination. This new information suggested that the OU1 ROD may have overestimated the size and scope of extraction and treatment system needed to achieve all the RAOs. In response to this new information, EPA required revision of the original scope of the OU1 remedial design (OU1 RD). The revised OU1 RD involved changes to the number and location of extraction wells that focused on groundwater releases from the SLI LFs and the properties immediately adjacent and upgradient (north) of the SLI property, to determine whether a smaller scale system could still meet the expectations of the OU1 ROD. The revised OU1 RD was approved by EPA in January 1999.

Construction of the approved OU1 groundwater remedial action (OU1 RA) began in January 1999 and was completed in April 2000. Full operation of the groundwater remediation system began in May 2000. The groundwater remediation system has been in operation since 2000. The groundwater remediation system has captured and treated contaminated groundwater and prevented contaminants from migrating toward existing municipal drinking water wells, which are two of the OU1 RAOs.

SCH has operated and monitored performance of the OU1 RA since 2000, with EPA oversight. After approximately 10 years of operation, SCH indicated that the effectiveness of extraction and treatment system to further improve groundwater conditions in the area downgradient of the SLI LFs had decreased, primarily because the VOC concentrations had been reduced in the extraction zone. In May 2013, SCH submitted a request to perform a "pump and treat system monitoring assessment/shutdown test."

The purpose of the pump and treat system monitoring/shutdown test will be to enable EPA to make a determination regarding the efficacy of continued operation of the groundwater remediation system to address the OU1 groundwater plume. The proposed two-year assessment period will allow

conditions to be rigorously evaluated for a defined period so that conditions before and after the shutdown test can be compared. The work plan for the shutdown test was approved by EPA and initiated by SCH in July 2013.

OU2: Landfill Cap and Gas Mitigation System

Construction of the closure caps for the SLI LFs, pursuant to the NJDEP ACO dated October 1984, began in 1985 and was completed in 1987. In April 1989, NJDEP gave their acceptance of the final cap construction. While not part of the Superfund action, EPA and NJDEP conferred on NJDEP's requirements.

The OU1 FS originally identified and evaluated three source control/landfill cap alternatives. However, the OU1 ROD stated that additional information and data were needed to determine the long-term effectiveness of the existing cap. Therefore, OU2 was not addressed in the OU1 ROD, but rather was to be the subject of a subsequent ROD.

The OU1 RI recognized that the SLI LFs had been previously closed and capped with the approval of NJDEP, under New Jersey solid waste regulations. The OU1 ROD deferred evaluation of a source control action (i.e., the adequacy of the landfill caps) until after the construction and operation of the remedy to address the migration of contaminated groundwater (OU1 RA).

EPA's 1991 UAO included requirements for a remedial design work plan (OU1 RDWP), which included a scope of work for supplemental investigation. The supplemental investigation consisted of installation of additional groundwater monitoring wells, water level measurements and, sampling and analysis of selected existing wells. The purpose of the supplemental investigation was to further define the vertical and lateral extent of the groundwater contaminant plumes.

The EPA-approved OU1 RDWP also included, at SLI's request, a design for an enhanced gas management system. The enhancements included expanding the existing gas management system so that landfill gas was collected more aggressively. Two phases of enhancing the gas management system were implemented and completed between September 1995 and December 1996. In conjunction with SLI's gas management system enhancements, certain drainage improvements were performed that facilitated drainage of stormwater runoff from the surface of the landfills as well as increased the caps' resistance to rainfall infiltration.

The groundwater remediation system has been in operation since 2000 (13+ years), the cap system has been in place since 1987 (26 years) and the SLI gas management enhancement system has been in operation since 1996 (17 years). Together with the OU1 RA, these landfill activities have reduced the continued degradation of groundwater and prevented contaminants associated with OU1 from migrating toward existing municipal drinking water wells.

OU3: Contaminated Soil and Groundwater Associated with Former BOC Gases Facility

A BOC Gases facility (now the responsibility of Linde, Inc.) operated on River Road, upgradient of the SLI LFs. It is within the Cinnaminson Groundwater Contamination Site. In 2008, EPA and Linde, Inc., entered into an Administrative Order on Consent (the "OU3 AOC") for the

performance of an RI/FS to address soil and groundwater contamination that is located on or migrating from the former BOC Gases facility. The work plan is being finalized and the field work for the RI is expected to commence in the spring 2014.

In conjunction with the RI/FS being implemented by Linde as part of OU3, EPA determined the need to perform a vapor intrusion (VI) investigation of nearby residential properties. The VI investigation performed by EPA between March 2009 and December 2010 revealed that vapors from VOCs, including TCE and PCE, associated with contaminated groundwater at the Site are also present in sub-slab soil gas and indoor air at several residential properties. Approximately sixty locations were sampled including residences, day care centers and a commercial building.

A removal action was performed by EPA in September 2010 to install vapor mitigation systems in residences known to be impacted. To date, vapor mitigation systems have been installed in three residences. The VI investigation is on-going and there is a potential that other residential/commercial locations overlying the groundwater plume may be impacted by the VOC vapors.

<u>OU4: Area-wide Groundwater Contamination Not Associated with Previously Identified Sources</u>

OU4 is intended to address groundwater contamination within the area-wide Site that has not been delineated as part of OU1 and OU3 (former BOC Gases facility). EPA is identifying and addressing data gaps in the delineation of groundwater contamination through an OU4 RI/FS. Fieldwork for the OU4 RI is expected to commence in the spring 2014.

**SITE CHARACTERISTICS**

A component of the 400-acre area-wide groundwater contamination Site is the two unlined SLI LFs operated by SLI and the subject of OU2. The SLI LFs are also known as the northwest and southeast landfills. The SLI LFs are considered a major source of groundwater contamination at the Site.

The SLI LFs are bounded by undeveloped land, a light industrial area and Taylors Lane to the north, Union Landing Road to the south, a wooded and light industrial area to the east and a heavy industrial area to the west. The surrounding area consists of a mixture of retail, residential and light-to-heavy industrial properties.

The Site lies within the bounds of the Delaware River flood plain and, therefore, the topography is very flat. The natural land surface elevation rises from 20 feet above mean sea level (MSL) along River Road to about 80 feet above MSL at Union Landing Road. The SLI LFs are an area of significant relief within the Site. Most of the Site area lies between 30 and 60 feet above MSL.

**Geology/Hydrology:** The geology of the Site is generally a series of inter bedded sands, clayey sands, and clays overlying bedrock. These strata dip and thicken southeastwards and collectively form the Potomac-Raritan-Magothy Formation (PRM) Aquifer.

There are three hydrogeologic units: the Wissahickon Formation (bedrock); the PRM Aquifer; and the Pennsauken Aquifer. The Pennsauken Aquifer directly overlies bedrock in the northern portion of the Site, just north of the closed landfills, and creates a groundwater mound coincident with an underlying bedrock high. Groundwater flow is radial (i.e. to the north, south, east and

west) from the top of this mound. In the extreme northwestern corner of the Site where the slope of the bedrock high flattens out and the Pennsauken Aquifer directly overlies the PRM, groundwater flows to the east around the bedrock high and continues southeast in the PRM. South of the mound, groundwater flow direction is south-southeast, away from the Delaware River. Depth to groundwater near the SLI LFs and downgradient is 40 to 50 feet below ground surface or MSL.

Historically, groundwater flow was towards the Delaware River. However, that changed due to regional pumping. Water levels subsequently increased regionally due to reduction in water supply pumping (related to greater use of Delaware River for water supply).

Groundwater pumping was eliminated at the municipal supply wells nearest the Site, the New Jersey American Water Company (NJAWC) New Albany Road public supply wells, after approximately 2005-2006. This resulted in a rise in groundwater level and a flattening of hydraulic gradients near the Site. With no pumping at the New Albany Road wells and pumping continuing at other NJAWC wells to the south, flow directions (including contaminant transport) have shifted more to the south/southeast away from the Delaware River.

## SCOPE AND ROLE OF THE ACTION

EPA is addressing the cleanup of the Site in four OUs. This is the second of the four planned OUs.

This Proposed Plan for OU2 addresses the adequacy of the NJDEP closure of the SLI LFs through the completed caps and installed landfill gas mitigation systems.

OU1 addresses groundwater contamination for which a major source is the SLI LFs. The groundwater remedy for OU1was described in the September 1990 OU1 ROD.

OU3 addresses soil and groundwater contamination at the former BOC Gases facility being investigated by Linde (a successor to BOC Gases) under the OU3 AOC entered into with EPA in 2008. Upon completion of the OU3 RI/FS, an OU3 ROD will be issued documenting the selection of an OU3 RA.

OU4 addresses groundwater contamination that has migrated beyond the identified source areas. EPA is performing an OU4 RI/FS that will integrate information gathered as part of the three other OUs, as well as gather additional information through supplemental field investigations. Upon completion of the OU4 RI/FS, an OU4 ROD will be issued documenting the selection of an OU4 remedy.

Completion of the work associated with the four OUs will result in a comprehensive RA that addresses area-wide groundwater contamination and is necessary to mitigate the identified unacceptable risks and to protect the public health, welfare and the environment from actual or threatened releases of contaminants into the environment.

## CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

**Groundwater Uses**: Groundwater underlying the Site is considered by New Jersey to be Class GW-2, a source of potable water. However, residents in the area of the Site are currently using a public water supply, which is sampled to assure all drinking water standards are met for VOCs, and other contaminants. The public water supplier pumps water from 17 municipal

wells that tap the PRM Aquifer system. This municipal system includes water treatment systems and regular testing, as required by the Clean Water Act and state regulations. These municipal wells are downgradient of the Site and there is a potential that these wells could be impacted by chemicals in the groundwater plume from the Site. If Site-related contaminated groundwater were to be used as drinking water in the future, elevated human health risks could exist.

**Land Uses**: Currently, land use in the immediate area of the Site consists of residential properties, farmland, and small to large industrial properties. The SLI LFs currently have the groundwater extraction and treatment system on Site, the OU1 RA remedy. It is anticipated that any future use of the SLI LFs would be commercial or industrial; there are limited passive uses that can be installed on top of closed landfills, such as solar panels for electricity generation.

## SUMMARY OF SITE RISKS

### Human Health Risk Assessment:

As part of the OU1 RI/FS, EPA conducted a baseline human health risk assessment (BHHRA) to estimate the current and future effects of contaminants on human health and the environment. A BHHRA is an analysis of the potential adverse human health effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land and groundwater uses.

A four-step human health risk assessment process was used for assessing site-related cancer risks and non-cancer health hazards. The four-step process is comprised of: hazard identification of chemicals of potential concern (COPCs), exposure assessment, toxicity assessment, and risk characterization (see box entitled "What is Risk and How is it Calculated" for more details on the risk assessment process).

COPCs were selected by comparing the maximum detected concentration of each analyte in air, sediment, surface water and groundwater with available risk-based

**WHAT IS RISK AND HOW IS IT CALCULATED?**

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a Site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

*Hazard Identification*: In this step, the chemicals of potential concern (COPCs) at the Site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

*Exposure Assessment:* In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

*Toxicity Assessment:* In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

*Risk Characterization:* This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of Site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a $10^{-4}$ cancer risk means a "one in ten thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to Site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of $10^{-4}$ to $10^{-6}$, corresponding to a one in ten thousand to a one in a million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is $10^{-6}$ for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a $10^{-4}$ cancer risk or an HI of 1 are typically those that will require remedial action at the Site.

screening values for potentially complete pathways. The primary chemicals identified as COPCs and requiring further evaluation in the baseline risk assessment were: benzene, PCE, TCE, vinyl chloride and arsenic.

The updated exposure assessment in the FFS identified potential human receptors based on a review of current and reasonably foreseeable future land use at the area of the Site under consideration for OU2, which is the SLI LFs.

Potential human receptors and associated exposure pathways included the following:

- current exposure of children playing in Pompeston Creek, Swede Run, SLI LF impoundments, other nearby industrial facility impoundments, and a nearby farm pond to COPCs via dermal contact and incidental ingestion of sediments;

- current exposure of residents and workers in the area to COPCs via inhalation of VOCs, and

- current or future exposure of residents to COPCs via ingestion of groundwater from the perched and regional aquifers in the plume area.

The toxicity assessment identified potential effects generally associated with exposure to the COPCs. Two types of toxic effects were evaluated for each receptor in the risk assessment, carcinogenic effects and non-carcinogenic effects. Calculated risk estimates for each receptor were compared to EPA's acceptable range of carcinogenic risk of $1x10^{-6}$ (one-in-one million), or one additional incidence of cancer in a population of one million people, based on exposure to the site-related contaminants under the scenarios described in the baseline risk assessment to $1x10^{-4}$ (one-in-ten thousand), and EPA's acceptable non-cancer hazard quotient less than or equal to a target value of one.

The risk characterization combined the exposure and toxicity information to determine estimated risks to the selected exposure groups. The BHHRA concluded that the following scenario had risks exceeding EPA's acceptable cancer or non-cancer target levels.

- The current and future exposure of residents via ingestion of groundwater resulted in significant risks ($6 \times 10^{-3}$) which requires remedial action. The risk scenario for the ingestion of groundwater was developed by assuming a resident would install a well in the PRM aquifer within the current area of groundwater contamination. The non-cancer Hazard Index for this scenario was 20.

The BHHRA concluded that the following scenarios did not have risks exceeding EPA's acceptable cancer or non-cancer target levels.

- Risks associated with the inhalation of VOCs by nearby workers or residents to chemical releases from the SLI LFs were evaluated. The results of this assessment revealed that no adverse carcinogenic or noncarcinogenic health effects are likely to occur as a result of exposure to inhalation of VOCs. The cancer risks associated with the inhalation of VOCs by nearby workers to chemical releases from the SLI LFs was $1 \times 10^{-11}$ and the non-cancer Hazard Index was $5 \times 10^{-7}$. The

cancer risks associated with the inhalation of VOCs by nearby residents to chemical releases from the SLI LFs was $7 \times 10^{-11}$ and the non-cancer Hazard Index was $7 \times 10^{-7}$.

- Risks associated with the potential that chemicals detected in surface water and sediment were likely transported by surface water run-off or leachate from the SLI LFs considered the possibility of trespassing children who might play in surface water of the SLI LF basins. Although considered unlikely, this exposure scenario was evaluated and the results of this assessment revealed that no adverse carcinogenic or non-carcinogenic health effects are likely to occur as a result of direct contact to surface waters at or near the SLI LFs. The cancer risks associated with the potential that chemicals detected in surface water and sediment were likely transported by surface water run-off or leachate from the SLI LFs considered the possibility of trespassing children who might play in surface water of the SLI LF basins. The cancer risk was calculated to be $8 \times 10^{-7}$ and the non-cancer Hazard Index was $9 \times 10^{-3}$.

**Ecological Risk Assessment:**

A Screening Level Ecological Risk Assessment (SLERA) was also performed that describes existing habitats and ecological receptor species that have been noted or are expected to be present on the Site, and evaluates the potential risks associated with the exposure of the biota to surface water, sediment and surface soil COPCs. The EPA uses an 8-step process, including numerous scientific/management decision points, for evaluating potential risks to potential receptors.

The SLERA is intended to allow a rapid determination as to whether the Site either poses no ecological risks, or to identify which contaminants and exposure pathways require further evaluation. Using conservative assumptions about potential ecological risks, it is determined that if no risks are estimated during the screening level evaluation, the ecological risk assessment process stops with the SLERA. If ecological risks are indicated by the SLERA, EPA may proceed to a more comprehensive baseline ecological risk assessment (BERA) to further refine and better evaluate the site-specific ecological risk.

The potential impacts associated with COPCs were assessed for nonhuman exposure at the Site. There are no endangered species or critical habitats located at the Site. It was determined that environmental risks were not significant.

**NON-CERCLA RESPONSE ACTIONS AT OU2**

The original closure plan developed and implemented by Waste Management, Inc., on behalf of SLI and approved by NJDEP included capping of the SLI LFs as well as installation of a landfill gas collection and venting system, and the initiation of a groundwater monitoring program.

Construction of the closure caps for the SLI LFs began in 1985 and was completed in 1987 and NJDEP gave their acceptance of the final cap construction in 1989.

The capping requirements outlined by NJDEP for the original closure plan included:

- Six inches of topsoil overlying 18 inches of a low permeability soil having a hydraulic conductivity no greater than 1 x $10^{-5}$ centimeters per second (cm/sec).

The as-built drawings provided to NJDEP in the report entitled: *Certification Report and As-Built Documentation for Site Closure* prepared for Waste Management dated April 1988 documenting cap construction indicated that the actual closure cap system construction consisted of:

- Six inches of topsoil, overlying 6 inches of sand overlying at least 18 inches of low permeability soil (an average of 20.4 inches was placed on the northwest landfill and 22.8 inches was placed on the southeast landfill). The average hydraulic permeability is 4.11 x $10^{-8}$ cm/sec.

The OU1 ROD issued by EPA in 1990 recognized that the SLI LFs had been previously closed and capped with the approval of NJDEP. The OU1 ROD deferred evaluation of a source control remedy (i.e. capping) until after the construction and operation of the groundwater remedy to address the migration of contaminated groundwater from the SLI LFs.

The EPA approved OU1 RD work plan included a SLI's proposed design for an enhanced landfill gas management system. Two phases of enhancing the gas management system were implemented and completed between September 1995 and December 1996.

The first phase of the SLI gas management system enhancements was performed by SCH from September 1995 through February 1996. This phase consisted of:

- Installation of thirty-four gas extraction wells;
- Installation of a portion of a new main header and lateral piping network;
- Installation of four condensate pump stations and drains;
- Construction of concrete foundations for the new system components; and,
- Installation of a new enclosed gas flare.

The second phase of the SLI gas management system enhancements was performed by SCH from May 1996 through December 1996. This phase included:

- Completion of the header and lateral piping network;
- Installation of ten gas monitoring probes;
- Completion of mechanical and electrical service for the new enclosed flare station and condensate pump stations; and,
- Connection to the existing gas management system.

Since the installation of SLI's enhancements to the active landfill gas management system, four probes have been regularly monitored for evidence of landfill gas migration. None of the measured levels of landfill gas exceeded allowable limits. The gas monitoring data show that the enhanced active landfill gas management system has controlled and further reduced the migration of landfill gas as well as effectively

extracting and treating SLI LFs gas from the SLI LFs.

In conjunction with the active gas management system enhancements, certain drainage improvements were performed that facilitated drainage of stormwater runoff from the surface of the landfills as well as increased the caps' resistance to rainfall infiltration. These improvements consisted of: culverts, rip-rap lined swales, rip-rap or gabion lined downchutes and aprons, rock check dams and swales lined with erosion control matting.

The discharge of stormwater from the SLI LFs is governed by a New Jersey Pollution Discharge Elimination System (NJPDES) General Permit. An associated Stormwater Pollution Prevention Plan (SPPP) that requires annual implementation and inspection re-certifications indicates that the SLI LFs are in compliance with the substantive requirements of the SPPP and NJPDES permit.

The SLI LF caps comply with all federal and any more stringent state "applicable or relevant and appropriate requirements" (ARARs) that are applicable to the management of the SLI LF wastes. The primary ARARs that the SLI LF caps meet are the waste management and disposal requirements promulgated under RCRA including 40 CFR Part 264 as well as the State of New Jersey closure and post-closure requirements under NJAC 7:26. In addition, in accordance with NJAC 7:26-2A.9(c)4, Waste Management, Inc., is in the process of obtaining a deed notice for the SLI LFs. The deed shall provide notice that any future disruption of the closed landfill shall require prior approval from the NJDEP in accordance with N.J.A.C. 7:26-2A.8(j).

## STATE ACCEPTANCE

The State of New Jersey concurs with the preferred alternative as presented in this Proposed Plan.

## COMMUNITY ACCEPTANCE

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD for this Site. Based on public comment, the preferred alternative could be modified from the version presented in this proposed plan. The ROD is the document that formalizes the selection of the remedy for a site.

## PREFERRED ALTERNATIVE

EPA recommends the no action alternative as the preferred remedial alternative for the OU2 Cinnaminson Groundwater Contamination Site remedy. The prior installation of the NJDEP-approved landfill cap has mitigated the risk pathway of the waste acting as a contaminant source to groundwater. EPA has determined that no additional landfill capping is required. The SLI LFs capping reduces infiltration of precipitation into the SLI LFs and provides safe management of the remaining material via a landfill cap and gas management system.

Since this alternative will result in contaminants remaining on-site (contained beneath the cap) above levels that would allow for unlimited use and un-restricted exposure, five-year reviews will be conducted.

## COMMUNITY PARTICIPATION

EPA and NJDEP provided information regarding the cleanup of the Cinnaminson Contaminated Groundwater Superfund Site to the public through meetings, the Administrative Record file for the Site, and announcements published in the Courier-Post. EPA and NJDEP encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted. The dates for the public comment period, the date/location/time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan.

For further information on EPA's preferred alternative for the Cinnaminson Groundwater Contamination Superfund Site:

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